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First Case of Renesting after Brood Loss by a Greater Prairie-Chicken

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ABSTRACT.—Production of a second brood, or double brooding, by a single female in one breeding season has not been reported for any species of grouse in North America. We describe the breeding history of one of 55 radio-marked female Greater Prairie-Chickens (*Tympanuchus cupido*) that successfully renested after losing a brood from a first nesting attempt during the 2011 breeding season in Kansas. Observations of double brooding by grouse might only be possible in areas like the Flint Hills of Kansas, where populations have a long breeding season in combination with a high rate of brood loss. *Received 15 August 2011. Accepted 28 October 2011.*

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Double-brooding has been defined as the production of two broods from two separate nesting attempts by a single laying female in one breeding season, but may or may not result in two broods fledging (Fredrickson and Hansen 1983). Theoretically, the production of second broods should increase the lifetime productivity and fitness of short-lived species of birds. However, the potential for birds to produce multiple broods in a single season is limited by the length of the nesting season, duration of a breeding attempt from clutch

initiation until offspring are independent, age of the nesting female, and food availability (Olsen et al. 2003). The production of multiple broods within a breeding season has been previously unreported for North American grouse (subfamily Tetraoninae), although common in other avian taxa (Labranche and Walters 1994, Guthery and Kuvlesky 1998, Morrison 1998, Pope and Crawford 2001, Olsen et al. 2003, Ortego 2004, Monroe et al. 2008, Mulvihill et al. 2009, Sandor and Moldovan 2010).

Greater Prairie-Chickens (*Tympanuchus cupido*) are a ground-nesting prairie grouse with an extant distribution ranging from Oklahoma to North Dakota (Johnson et al. 2011). Populations in the southern extent of their distribution in Kansas are characterized by having long breeding seasons, high nesting propensity, large clutch sizes, and high rates of renesting after failure of first nests (McNew et al. 2011). Chicks fledge and can achieve short flights at 14 days of age but are not independent until 40–85 days of age (Johnson et al. 2011, McNew et al. 2011). We report on the breeding history of a radio-marked female Greater Prairie-Chicken in Kansas that successfully hatched a nest and then renested after losing the brood from her first nesting attempt.

METHODS

We placed necklace-style radio transmitters (Model A3950, Advanced Telemetry Systems, Isanti, MN, USA) on 55 female Greater Prairie-Chickens captured at 13 leks during 11 March–5 May 2011 in Chase, Greenwood, and Morris counties, Kansas (UTM Zone 14 N: 0717451 E, 4266117 N) as part of a study evaluating prairie-chicken ecology within the intensively-grazed Flint Hills ecoregion. Annual spring burning of residual vegetation over large extents of native tallgrass prairie is common and cattle grazing is the dominant land use in the Flint Hills (McNew et al. 2011).

OBSERVATIONS

We captured and equipped a female Greater Prairie-Chicken on 4 April 2011 with a uniquely numbered aluminum leg band (#1249) and radio transmitter. The radio-marked female was monitored ≥3 times per week from vehicles during the nesting and brood-rearing period (Apr–Aug). The female was flushed on 10 May and had a nest with 12 eggs. We estimated, via floatation and back-dating from day of hatch, the clutch was initiated on 21 April. Nest attendance by the female was monitored remotely by telemetry every 1–3 days throughout the incubation period. The last date the female was known via telemetry to be incubating her first nest was 27 May, and she was first detected to be away from her nest on 28 May. On 29 May, we visited the nest site and confirmed via eggshell remains that all 12 eggs successfully hatched on 27 May. On 29 May, the female was discovered to have moved 3.2 km from her location the previous day, suggesting potential total brood loss of the newly hatched and flightless young. We flushed the hen on 13 June when her chicks should have been 16 days of age, and conducted a thorough search for chicks; finding none. We conducted a second flush count the following day and again counted no chicks; confirming her first brood had been lost sometime during the pre-fledge period (likely prior to her long movement on 29 May when chicks were 2 days of age). We continued to monitor the female by telemetry and on 22 June we discovered this female incubating a second nest of eight eggs. We estimated with egg flotation that the second nest was initiated on 10 June, indicating 13 days between the time when her first brood failed and when she began laying her second clutch. The distance between her first and second nest was 2.9 km. The female's second clutch successfully hatched all eight chicks on 15 July. We conducted a flush count at 14 days post hatch (29 July) and found the second brood failed during the pre-fledging period. A second flush of female 1249 was conducted on 30 July to confirm the absence of chicks.

DISCUSSION

The production of multiple broods is thought to be an adaptive life history strategy for some populations of birds where survival and future breeding effort is not diminished (Perrins 1970, Boer-Hazewinkel 1987). Low occurrence of second broods has been reported for other species of gallinaceous birds in North America: Northern Bobwhite (*Colinus virginianus*; Sandercock et al. 2008), Mountain Quail (*Oreortyx pictus*; Pope and Crawford 2001), Wild Turkey (*Meleagris gallapavo*; Keegan and Crawford 1993), and Ring-necked Pheasant (*Phasianus colchicus*; Gates 1966, Dumke and Pils 1979). Renesting after loss of a brood has only been documented in one other species of grouse, the Scottish Red Grouse (*Lagopus lagopus scoticus*; Kirby and Smith

2005). Selection has not favored production of multiple broods by gallinaceous birds due in part to limited benefit of this strategy for increasing productivity (Guthery and Kuvlesky 1998, Sandercock et al. 2008). Our observation may not be considered true double-brooding, as two successful broods were not produced, but our field report is the first case of a female prairie grouse producing two broods in the same breeding season. Occurrence of double-brooding is likely extremely rare in prairie-chickens because females provide uniparental care during incubation and brood-rearing, and juveniles are attended by females for 60–85 days after hatch (Johnson et al. 2011, McNew et al. 2011). Only one of our six radio-marked hens which lost their first broods before chicks fledged was known to have renested following brood loss in this study, and previous research did not document second broods for any of 47 cases in which radio-marked female Greater Prairie-Chickens lost their first broods prior to fledging (McNew et al. in press). Double-brooding may be more common in the Flint Hills ecoregion than other portions of the species' range because the breeding season is long and brood mortality is high during the pre-fledging period (>70%; McNew et al. in press). However, production of a second brood is likely limited to females which lose their first broods early due to a long brood-rearing period and relatively high survival of juveniles from fledging to recruitment (~0.5; McNew et al. in press).

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